

## WATER-SPOUTS.

Mr. James Mainwaring, observer on the s. s. "Athos," Capt. Horatio Law, commanding, reports having observed several water-spouts off the east end of Jamaica, W. I. on May 18, 1887.

Capt. W. N. Aldrich, of the schooner "Comet," reports water-spouts as follows: May 18th, N. 22° 08', W. 94° 40', one

small one; 28th, N. 25° 07', W. 86° 05', three within half an hour; 29th, N. 24° 15', W. 85° 25', two in northeast and one in southeast.

Captain Garvie, of the s. s. "Caledonia," reports having observed a large water-spout in N. 38° 30', W. 17° 0', on May 29th.

## COTTON REGION REPORTS.

In the following table are given the means of the maximum and minimum temperatures, and the average rainfall for the cotton-belt districts during the month. For the purpose of comparison the means for the four preceding years are also given. The district of Wilmington, only, shows an excess of precipitation, 1.10 inches above the normal; all the other districts have deficiencies, ranging from 0.22 inch for the district of Mobile to 2.81 inches for the district of Memphis. The district of Wilmington shows the greatest average precipitation for the month, 4.81 inches, and the district of Memphis the least, 1.88 inches.

The means of the maximum and minimum temperatures are in all districts above the normal; the departures of the maximum temperature ranging from 2° 1 for the district of Savannah to 6° 4 for the district of Memphis, and the departures of the minimum temperature from 0° 4 for the district of Charleston to 5° 1 for the district of Little Rock. The district of Galveston shows the highest maximum temperature for the month, 101° 0, and the district of Vicksburg the lowest minimum temperature, 30° 0.

Temperature and rainfall data for the cotton districts, May.

Districts.	Rainfall.			Temperature.								Extremes for May, 1887.	
	Average for May of four preceding years.	Average for May, 1887.	Departures.	Maximum.			Minimum.						
				Mean for May of four preceding years.	Mean for May, 1887.	Departures.	Mean for May of four preceding years.	Mean for May, 1887.	Departures.				
									Max.	Min.			
New Orleans...	Inch. 5.46	Inch. 4.13	Inch. — 1.33	83.7	88.3	+ 4.6	62.6	63.6	+ 1.0	100	44		
Savannah.....	3.12	2.44	— 0.68	85.5	87.6	+ 2.1	62.0	53.6	+ 1.3	100	43		
Charleston.....	3.46	3.55	+ 0.09	83.5	86.3	+ 2.8	59.4	59.8	+ 0.4	94	44		
Atlanta.....	3.02	2.65	— 0.37	80.3	85.2	+ 4.9	56.5	59.4	+ 2.9	98	44		
Wilmington...	3.71	4.81	+ 1.10	80.9	83.1	+ 2.2	56.1	60.0	+ 3.9	97	43		
Memphis.....	4.69	1.88	— 2.81	79.9	85.7	+ 5.8	56.4	60.5	+ 4.1	97	40		
Galveston.....	6.53	4.53	— 2.00	83.5	87.2	+ 3.7	62.1	63.5	+ 1.4	101	38		
Vicksburg.....	5.79	3.95	— 1.84	82.6	87.4	+ 4.8	61.1	61.5	+ 0.4	99	30		
Montgomery...	3.23	2.88	— 0.35	83.5	86.8	+ 3.3	58.8	63.0	+ 4.2	97	46		
Augusta.....	3.17	2.52	— 0.65	83.3	86.6	+ 3.3	58.8	59.9	+ 1.1	97	41		
Little Rock.....	5.65	4.05	— 1.60	79.6	83.9	+ 4.3	55.3	60.4	+ 5.1	97	35		
Mobile.....	3.96	3.74	— 0.22	82.5	87.8	+ 5.3	60.1	62.2	+ 2.1	98	43		

## INLAND NAVIGATION.

## STATE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various river stations and the highest and lowest depths for May, 1887, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, May, 1887.  
[Expressed in feet and tenths.]

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
<b>Red River:</b>						
Shreveport, La.....	29.9	21, 22, 23	16.7	2	2.7	14.0
<b>Arkansas River:</b>						
Fort Smith, Ark.....	22.0	7	9.0	16, 17	3.2	5.8
Little Rock, Ark.....	23.0	6	16.5	3	4.4	12.1
<b>Missouri River:</b>						
Omaha, Nebr.....	18.0	24	9.8	2 to 8	7.6	2.2
Leavenworth, Kans.....	20.0	25	12.3	8	9.0	3.3
<b>Mississippi River:</b>						
Saint Paul, Minn.....	14.5	1, 2	5.8	31	3.4	2.4
La Crosse, Wis.....	24.0	1	10.3	31	5.0	5.3
Dubuque, Iowa.....	16.0	1	13.7	31	5.8	7.9
Davenport, Iowa.....	15.0	1	11.1	31	4.3	6.8
Keokuk, Iowa.....	14.0	2, 3, 4	11.0	31	4.7	6.3
Saint Louis, Mo.....	32.0	7	18.4	25	14.6	3.8
Cairo, Ill.....	40.0	2	39.3	31	17.6	21.7
Memphis, Tenn.....	34.0	5	31.6	31	15.2	16.4
Vicksburg, Miss.....	41.0	14, 15	38.2	31	25.9	12.3
New Orleans, La.....	13.0	19	12.5	31	10.2	2.3
<b>Ohio River:</b>						
Pittsburg, Pa.....	22.0	1	10.7	23	2.2	8.5
Cincinnati, Ohio.....	50.0	2	35.0	31	9.8	25.2
Louisville, Ky.....	25.0	1, 2, 3	12.4	31	5.6	6.8
<b>Cumberland River:</b>						
Nashville, Tenn.....	40.0	3	20.3	30	3.9	16.4
<b>Tennessee River:</b>						
Chattanooga, Tenn.....	33.0	1	6.6	22, 23, 24	4.6	2.0
<b>Monongahela River:</b>						
Pittsburg, Pa.....	29.0	1	10.7	23	2.2	8.5
<b>Savannah River:</b>						
Augusta, Ga.....	32.0	13	8.8	24, 30, 31	6.0	2.8
<b>Sacramento River:</b>						
Sacramento, Cal.....		1	20.5	16, 17, 18	18.0	2.5
<b>Willamette River:</b>						
Portland, Oregon.....		31	21.2	1	10.5	10.7

**Hudson River.**—Albany, N. Y.: from the 17th of April until the 1st of the current month the river rose steadily, and at

noon of the latter date was thirteen feet above low-water mark. On the 2d, 3d, and 4th the water receded slowly, but rose slightly on the 5th.

**Mississippi River.**—Cairo, Ill.: the river at this point reached its highest stage, 39.3 feet above low water, on the 2d; from the 2d until the 18th it fell slowly to 25.0 feet; from the 18th to 21st it rose .4 foot; from the 21st to the end of the month it fell steadily, being on the 31st 17.6 feet above low-water mark.

**Cumberland River.**—Nashville, Tenn.: the river was at its greatest height on the 3d. After the 3d it fell steadily, and at the end of the month was only 3.9 feet above low-water mark.

**Lake Superior.**—Duluth, Minn.: the lake at this port was filled with broken ice until the 9th, when it moved out before a northwesterly wind. Navigation opened on the 6th; on this date the propeller "Spokane" arrived from Buffalo, N. Y., and the "Jas. Fisk, jr." departed.

**Marquette, Mich.:** on the 1st the broken ice in the harbor was driven out by a strong southwest wind. On the 2d several vessels left for ports on the lower lakes.

**Fort Totten, Dak., 7th:** the navigation on Devil's Lake opened to-day. The steamer "Minnie H.," Capt. E. E. Herrman, made the first trip of the season.

**Fort Smith, Ark., 31st:** the river has remained higher this month than it has been since January. Copious rains fell both at this point and above here on the river.

## FLOODS.

**Augusta, Me.:** at the beginning of the month the rivers in Maine, swollen by the heavy rains of the last two days of April and the consequent melting of the large amount of snow in the forests, were unusually high. On the 1st the Kennebec and its branches were at flood height; in the vicinity of Augusta the river was about twelve feet above its average height, and flowing swiftly. All cellars and basements in the lower part of the city were flooded. In the surrounding country great damage was done; many bridges were carried away, roads

destroyed, and travel rendered difficult. Reports from Waterville, Gardiner, Fairfield, and other places on the Kennebec, state that the river was higher on the 1st and 2d than it has been since 1869. The Maine Central Railroad was covered with water at several places. At Somerset Mills a raft of logs worth \$20,000 was broken up and carried to the sea.

Bangor, Me.: on the 29th and 30th of April, and during the first sixteen days of the current month, the water in the Penobscot River and its tributaries was, owing to heavy rains and melting snow in the forests and mountains, at a higher stage than it has been for many years, entailing severe losses on lumbermen, saw-mill owners, and farmers along their banks. At Ellsworth several booms and wing-dams were broken, and large numbers of logs floated out to sea. At Sangerville, Hartford, Linn, and other towns on the river, great damage was done to the manufacturing interests, several woolen and cotton mills being flooded, undermined, or otherwise injured, causing a suspension of operations and large losses. On the 13th the river was reported to have been still at an unusual height, and over its banks from Pamedecook Lake to the sea. The railroad from Bangor to Saint John, New Brunswick, and the country through which it passes, was badly washed, and traffic between Bangor and Vanceborough was suspended from the 1st to 12th. Reports from Danforth, Washington Co., on the 6th stated that the water at that place had reached a height eighteen inches higher than any previous record.

Pittsburg, Pa.: on the afternoon of the 7th a heavy thunder-storm, with rain and hail, passed over this station. Several buildings were struck by lightning and slightly damaged. Along Paint Creek, in Cambria county, a very heavy fall of rain occurred, causing the creek to rise suddenly and overflow the Somerset and Cambria Railroad, and damaging much property in the village of Johnstown. Many thousands of logs and numerous bridges were carried away. At Hooversville more than twenty bridges were washed from their foundations, and the cellars of nearly all dwellings flooded. At Morrillville,

Minersville, Cambria City, and Coopersdale many persons were temporarily rendered homeless. It is estimated that the flood ruined property to the extent of \$150,000.

Lynchburg, Va.: heavy rain fell from 8 p. m. of the 9th until the early morning of the 10th; at 9.10 a. m. it again began falling heavily and continued until 9.25 p. m. The storm did no damage in this vicinity, but along the valley of the Sandy River several mills, dams, and bridges were carried away.

Petersburg, Va.: on the 11th and 12th very heavy rain fell in the eastern part of the state and streams in the lower counties, along the coast, were higher than they had been for years. The abutments of an iron bridge which spans Fountain Creek, on the Petersburg and Weldon Railroad, were washed away and the bridge was carried down the stream. A number of mills and small bridges in several southeastern counties were damaged, as well as many acres of peanut and corn.

Laredo, Tex.: the heavy rains which fell throughout the Rio Grande Valley during the night of the 14-15th caused the Rio Grande River to rise rapidly; from midnight to noon the river rose eight feet. On the 15th the custom-house at Laredo was washed away, and one of the largest ferry boats on the river was sunk.

Gorham, Coos Co., N. H.: on the 14th the Androscoggin River between this place and Umbagog Lake was higher than it has been for several years, the flood having been caused by the melting of the winter snowfall in the lake region. A portion of the streets in Gorham was covered with water to a depth of three feet. No serious damage was reported.

Las Animas, Colo.: although but little rain accompanied the thunder-storms of the 26th, 27th, and 28th in this immediate vicinity, in the surrounding country very heavy rain fell and caused streams to rise rapidly. Washouts occurred on the Atchison, Topeka, and Santa Fé Railroad, both east and west of this place.

## HIGH TIDE.

Cedar Keys, Fla., 26th.

## ATMOSPHERIC ELECTRICITY.

## AURORAS.

During the month no unusual auroral displays occurred; those observed during the nights of the 23-24th to 25-26th, the most extensive seen, were reported from New England westward to Montana and as far south as New Jersey, but cloudiness in the Lake region obscured the displays in that district. These auroras were not of unusual brilliancy and no appreciable influence upon telegraph lines has been reported. From the reports received it appears that the displays were most brilliant in Minnesota and Dakota. At Moorhead, Minn., the aurora appeared in the form of a double arch, with streamers moving from east to west, and similar reports are received from other stations in the extreme northwest.

Auroras were reported during the month as follows:

2d.—Pekin, Ill.; Nashua, N. H.; Boston, Mass.; Fort McGinnis, Mont.

3d.—Bismarck and Fort Totten, Dak.

4th.—Poplar River, Mont.

11th.—Pekin, Ill.; Orono, Me.

12th.—Morganfield, Ky.; Orono and Eastport, Me.; Mount Washington, N. H.; Northfield, Vt.; Saint Vincent, Minn.

13th.—Eastport, Me.

14th.—Duluth, Minn.

17th.—Cresco, Iowa; Mackinaw City, Mich.; Fort Assinaboine, Mont.

18th.—Fort Madison, Iowa; Delavan, Embarras, and La Crosse, Wis.; Grand Haven, Mich.; Bismarck and Fort Totten, Dak.

19th.—Bismarck, Dak.; Poplar River, Mont.

20th.—Webster, Dak.

21st.—Egg Harbor City, N. J.

22d.—Windsor, Ill.; Poplar River, Mont.

23d.—Quakertown and Dyberry, Pa.; Cambridge (aurora suspected) and Blue Hill Observatory, Mass.; Beverly, Clayton, Moorestown, N. J.; Independence, Iowa; North Colebrook, Voluntown, and New Haven, Conn.; Parkston and Fort Totten, Dak.; Berlin Mills, Nashua, and Mount Washington, N. H.; Prairie du Chien, Wis.; Northfield, Vt.; Poplar River, Mont.

24th.—Orono and Bar Harbor, Me.; Independence and Cresco, Iowa; Parkston and Fort Totten, Dak.; Berlin Mills and Mount Washington, N. H.; Northfield, Vt.; Grand Haven, Mackinaw City, and Port Huron, Mich.; Moorhead and Saint Vincent, Minn.; Fort Custer and Poplar River, Mont.

25th.—Newport and Northfield, Vt.; Monticello, Iowa; Windsor, Ill.; Poplar River, Mont.

26th.—Duluth, Minn.

31st.—Northfield, Vt.

## THUNDER-STORMS.

Thunder-storms are reported to have occurred in the various states and territories as follows:

Alabama.—6th, 11th, 13th, 14th, 17th to 19th, 21st, 23d to 26th, 29th, 31st.

Arizona.—18th, 25th to 27th, 29th, 30th.

Arkansas.—2d, 4th, 9th, 10th, 12th, 14th to 17th, 22d to 26th, 28th to 31st.

California.—6th, 14th to 16th, 18th to 20th, 22d, 26th, 29th to 31st.

Colorado.—3d, 13th to 16th, 18th, 21st to 23d, 26th to 28th, 31st.

Connecticut.—6th, 7th, 25th, 26th.

Dakota.—1st, 2d, 7th to 9th, 11th to 14th, 20th to 23d, 25th to 28th.